Claim Listing

1–34. (cancelled)

35. (new) A method in the surface sizing of a paper or board web having a first surface and a second surface, the method comprising the steps of:

applying a surface size with an applicator device to at least the first surface of the web, wherein the web has pores leading from the first surface and the second surface into inner layers of the web;

applying a pressure effect to the first surface or second surface of the web by subjecting at least the first surface or the second surface of the web to a change in pressure; and

forcing the surface size to penetrate into the pores leading into inner layers of the web, as a result of the pressure effect.

36. (new) The method of claim 35 wherein the step of applying a surface size is the step of applied a starch solution.

37. (new) The method of claim 35, wherein a vacuum is created in the pores of the web by the pressure effect, and wherein the vacuum in the pores sucks the surface size applied to the first surface of the web into the pores leading into the inner layers of the web.

38. (new) The method of claim 37, wherein the surface size is applied to the first surface of the web and a vacuum effect is applied to the second surface of the web to cause air to flow through the web such that surface size moves from the first surface of the web in a direction toward the second surface of the web and thus into the inner layers of the web.

39. (new) The method of claim 38, wherein the application of the surface size to

the first surface of the web is performed in at least two successive stages.

40. (new) The method of claim 38, wherein the vacuum effect is applied to the web in at least two successive stages.

41. (new) The method of claim 38, wherein the application of surface size to the web is started before the web is subjected to the vacuum effect.

42. (new) The method of claim 41, wherein the application of surface size to the web is stopped before the web is subjected to the vacuum effect.

43. (new) The method of claim 41, wherein the surface size is applied to the web before the web is subjected to a first stage of the vacuum effect and that, after the first stage of the vacuum effect, at least one further layer of surface size is applied to the web while the web is subjected to a second stage of the vacuum effect.

44. (new) The method of claim 41, wherein the vacuum effect is continued after the application of surface size.

45. (new) The method of claim 35, wherein the surface size is applied to the first surface of the web and wherein the step of applying a pressure effect to the first surface or second surface of the web comprises applying a vacuum effect to the first surface of the web.

46. (new) The method of claim 45, wherein the vacuum effect is applied to the web before the application of surface size to the web is started.

47. (new) The method of claim 46, wherein the application of surface size to the web is started immediately when the application of the vacuum effect to the web is stopped.

48. (new) The method of claim 45, wherein in order to keep the web balanced, a vacuum effect is also applied to the second surface of the web.

49. (new) The method of claim 45, wherein after the application of surface size an overpressure effect is applied to the web to force surface size into the pores of the web.

50. (new) The method of claim 35, wherein the step of applying the surface size with the applicator device to at least the first surface of the web further comprises applying the surface size with a second applicator device to the second surface, and wherein the absorption of surface size into the pores of the web is enhanced by means of a pressure effect on both the first surface and the second surface of the web.

51. (new) The method of claim 35, wherein the penetration of surface size into the web is controlled by controlling the pressure effect applied to the web.

52. (new) The method of claim 35 wherein the pressure effect includes a vacuum effect which has a vacuum level applied to the web which is controlled and maintained in a range of 5–80 kPa.

53. (new) The method of claim 35 wherein the pressure effect includes a vacuum effect which has a vacuum level applied to the web which is controlled and maintained in a range of 5–40 kPa. .

54. (new) The method of claim 35 wherein two-sidedness of the web with respect to selected parameters is controlled with vacuum applied to the first surface and the second surface of the web.

55. (new) The method of claim 50, wherein between applying the surface size to

the first surface of the web and applying the surface size to the second surface of the web, the web is dried.

56. (new) An apparatus for surface sizing a paper or board web, the apparatus comprising:

a paper or board web having a first side and a second side, and pores leading from the first side and the second side into inner layers of the web, the web following a path through the apparatus defining a running direction;

at least one surface size applicator arranged to apply surface size to the first side of the web; and

at least one applicator device for applying vacuum and/or overpressure to the web to force surface size to penetrate into pores of the web.

57. (new) The apparatus of claim 56, wherein the device for applying vacuum and/or overpressure comprises at least one means for creating a vacuum in the pores of the web to suck surface size applied to the surface of the web from the surface of the web into the pores and the inner layers of the web.

58. (new) The apparatus of claim 57, wherein the at least one means for creating a vacuum is arranged to create a vacuum effect on the web on the second side of the web to cause air to flow through the web from the first side in a direction defined by the second side and thus to transfer surface size from the first side of the web in the direction of the second surface of the web into the inner layers of the web.

59. (new) The apparatus of claim 58, wherein at least two applicator device are arranged such that the application of surface size to the first side of the web is performed in at least two successive stages.

60. (new) The apparatus of claim 57, wherein the at least one applicator device and the at least one means for creating a vacuum are arranged successively in the running direction of the web such that a vacuum effect created by the means for creating a vacuum begins only after the application of surface size accomplished by the at least one applicator device.

61. (new) The apparatus of claim 56 wherein the at least one applicator device contains starch.

62. (new) The apparatus of claim 57, wherein the at least one means for creating a vacuum is arranged with respect to the at least one applicator device such that an application point of surface size is situated in an area where the means for creating a vacuum is arranged to produce a vacuum effect.

63. (new) The apparatus claim 57 wherein the at least one means for creating a vacuum creates a vacuum which is arranged to be controlled.

64. (new) The apparatus of claim 57, wherein the at least one means for creating a vacuum to the web comprises a suction roll.

65. (new) The apparatus of claim 64, wherein the suction roll has a suction zone which forms an area of a vacuum effect.

66. (new) The apparatus of any one claim 57, wherein the at least one means for creating a vacuum to the web comprises a vacuum device which is a suction box.

67. (new) The apparatus of claim 57 wherein the at least one means for creating a vacuum comprises a vacuum device which is a vacuum shoe.

68. (new) The apparatus of claim 56, wherein the at least one applicator device comprises a contact-free applicator device.

69. (new) The apparatus of claim 68 wherein the contact-free applicator device comprises a spray coater.

70. (new) The apparatus of claim 56 wherein the at least one applicator device is a film sizing device.

71. (new) A paper or board web surface sizing apparatus comprising:

a paper or board web having a first side and a second side, and pores leading from the first side and the second side into inner layers of the web, the web following a path through the apparatus defining a running direction;

a turning roll which engages the web to cause the web path to follow a curve, the web having a first side facing away from the turning roll and a second side which engages the roll;

a first vacuum nozzle arranged to suck air from the web after the turning roll to form an vacuum in pores in the web; and

an applicator for applying surface size to the web first side, the applicator being positioned after the vacuum nozzle.

72. (new) The apparatus of claim 71 further comprising a trough disposed at the curve and arranged to guide a main part of an air flow traveling with the web, away from the web first side.

73. (new) The apparatus of claim 72 wherein the first vacuum nozzle is arranged to suck air from the first side of the web after the trough.

74. (new) The apparatus of claim 73 further comprising a second vacuum nozzle arranged after the turning roll on the second side of the web, the second vacuum nozzle directed to cause vacuum in the pores of the web.

75. (new) The apparatus of claim 74 further comprising a first overpressure nozzle positioned after the applicator and arranged to put pressure on the first side of the web and a second overpressure nozzle arranged to arranged to put pressure on the second side of the web after the applicator.